

# CONSTRUCTION ENGINEERING TECHNOLOGY (CNST)

## CNST-1050 Construction Safety Awareness

1 Credit

Construction safety awareness covers the OSHA curriculum for the 10-hour Outreach Training program for Construction Safety and Health. Topics include an introduction to OSHA, fall protection, struck by, caught in or between hazards, electrical hazards, fire protection, material handling, equipment safety, concrete and masonry construction, welding and cutting, excavation, stairways and ladder safety and other applicable topics.

Laboratory: 2 hours

Prerequisite(s): None. Course may not be taken if student already has completed CNST-1750.

## CNST-1060 General Industry Safety Awareness

1 Credit

General Industry safety awareness covers the OSHA curriculum for the 10-hour Outreach Training program for General Industry Safety and Health. Topics include: an introduction to OSHA, fall protection, struck by, emergency action plan, electrical hazards, fire protection, material handling, equipment safety, Machine guarding, hazards communication, respiratory protection, lock-out-tag out, permit required confined spaces, and other applicable topics.

Laboratory: 2 hours

Prerequisite(s): None. Course may not be taken if student already has completed CNST-1760.

## CNST-1281 Construction Engineering Orientation

3 Credits

Introduction to construction management principles. Recognition of professional practices, current issues and developments in construction, including , stages of a construction project, management roles and responsibilities, and concepts for estimating, planning, and scheduling.

Lecture: 3 hours

Prerequisite(s): None.

## CNST-1290 Construction Print Reading

2 Credits

Overview of construction drawings for the major construction disciplines to understand presentation methods, interpretation, sequence of preparation, bid submittal processes, revision control, and code requirements. Commercial building, structural, civil, and highway drawings utilized. Introduction to Maintenance of Traffic drawings and stormwater management related drawings.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): None

## CNST-1410 Architectural CAD I

3 Credits

Working drawing techniques of domestic structures using computer-aided drafting software. Floor plans, foundation plans, wall-sections, elevations, site plans and dimensioning techniques will be the core concepts.

Lecture: 1 hour. Laboratory: 4 hours

Prerequisite(s): CNST-1290 Construction Print Reading; or departmental approval.

## CNST-1510 Green Building & Sustainability I

3 Credits

Introduction to Green Building and sustainability issues. Study of current practices, systems, and materials used in the construction of Green buildings. Recognition of planning and design features that enhance the energy efficiency of a building and its environment. Overview of Green Building Rating Systems.

Lecture: 3 hours

Prerequisite(s): None.

## CNST-1660 Material Testing

2 Credits

Application of standard procedures for sampling and testing construction materials. Students will use laboratory equipment to test conditions of asphalt, concrete, and soil in relationship to stated material specifications, and then record testing results for analysis by supervisory personnel.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): MATH-0955 Beginning Algebra or qualified math placement, and CNST-1290 Construction Print Reading, or concurrent enrollment.

## CNST-1670 Highway Inspection

2 Credits

Introduces the concepts of field inspection and testing procedures; their applications to various construction activities, equipment, and products, and general work zone operations; interpretation of contract plans and specifications; project record keeping and reporting; and supervisory functions. Field trips may be required.

Lecture: 1 hour. Laboratory: 2 hours

Prerequisite(s): CNST-1290 Construction Print Reading and MATH-0955 Beginning Algebra or qualified math placement.

## CNST-1740 Fundamentals of Geographic Information Science

3 Credits

[This course is cross-listed as GEOG-1740. Credit can only be earned once for either course.] Introduction to geographic information science with a focus on learning Geographic Information Systems (GIS) software. Topics include map, interpretation, and analysis, coordinate systems, map projections, scales, topographic mapping, accuracy versus precision, spatial analysis techniques, types of thematic mapping, sources of data, basic database management, advantages and limitations of GIS, and an introduction to applications in engineering, engineering technology, and the sciences. Students are expected to have basic computer skills prior to taking this course.

Lecture: 2 hours. Laboratory: 2 hours

Prerequisite(s): MATH-1410 Elementary Probability and Statistics I, or MATH-1470 Modern Mathematics for Business and Social Sciences I, or MATH-1530 College Algebra or higher.

OAN Approved: Transfer Assurance Guide OSS051.

## CNST-1750 Construction Safety

3 Credits

The theories and principles of construction safety and health applied to real-world setting. Upon completion of course materials and required attendance hours, students receive their OSHA 30 certification.

Lecture: 3 hours

Prerequisite(s): None. CTAN Approved: Career Technical Assurance Guide CTC0N002.

### **CNST-1760 General Industry Safety**

#### **2 Credits**

The theories and principles of general industry safety and health applied to real-world settings. Covers Occupational Safety and Health Administration (OSHA) regulations, employee rights and employer obligations. Includes certificate of Training in basic Industry Safety (OSHA 30: 29 CFR Parts 1910). Must attend designated class dates and pass related competency exams to earn training certificate.

*Lecture: 1 hour. Laboratory: 2 hours*

*Prerequisite(s): None.*

### **CNST-1770 Hazardous Waste Operations and Emergency Response**

#### **2 Credits**

Comprehensive instruction in the health and safety planning and procedures for 1) uncontrolled hazardous waste site work; 2) hazardous waste treatment, storage or disposal facilities (TSDFs) work; and 3) emergency responses to hazardous materials releases. Meets OSHA's certification requirements for the "40 hour" off-site training portion of 29 CFR 1910.120 (the "HAZWOPER" standard).

*Lecture: 1 hour. Laboratory: 3 hours*

*Prerequisite(s): None*

### **CNST-2110 Basic Survey Practices**

#### **3 Credits**

Study of construction site engineering using survey instruments for elevation contours, drainage, and grading for construction. Laser-levels, transits, and total stations will be utilized. Emphasis on instrument applications and field data recording.

*Lecture: 2 hours. Laboratory: 3 hours*

*Prerequisite(s): MATH-1540 Trigonometry or qualifying math placement to enroll in MATH-1610; and CNST-1290 Construction Print Reading; or departmental approval.*

*OAN Approved: Transfer Assurance Guide OET015.*

### **CNST-2131 Construction Methods and Materials**

#### **3 Credits**

Study of common construction principles that affect jobsite performance, material selection and testing, and the general properties of traditional materials used. There will be focus on sustainability of materials and an introduction to non-traditional materials used in building assemblies.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-1290 Construction Print Reading; and MATH-0910 Basic Arithmetic and Pre-Algebra, or qualified Math placement; or departmental approval.*

*OAN Approved: Transfer Assurance Guide OET016 and Career Technical Assurance Guide CTCON003.*

### **CNST-2140 Advanced Material Testing & Inspection**

#### **2 Credits**

Introduces students to advanced material testing procedures and field inspection. Concrete and asphalt pavement construction methods, inspection, and testing processes. Inspection of surfaces and tolerances. Calculation of quantities. Utility and incidental construction inspection. Work zone configurations. Project responsibilities and documentation. Field trips may be required.

*Lecture: 1 hour. Laboratory: 2 hours*

*Prerequisite(s): CNST-1670 Highway Inspection, and CNST-2131 Construction Methods and Materials; or department approval.*

### **CNST-2201 Introduction to Building Information Modeling**

#### **3 Credits**

Introduction into building information modeling (BIM). 3-dimensional software will be used to generate a building model and related drawings used in a set of contract documents. BIM software also used to determine material take-off quantities for to create estimates.

*Lecture: 1 hour. Laboratory: 4 hours*

*Prerequisite(s): CNST-1290 Construction Print Reading; or departmental approval.*

### **CNST-2210 Mechanical and Electrical Systems**

#### **3 Credits**

Study of mechanical and electrical systems for building construction, water supply, waste and sanitation. Heat loss, heat gain and hydronic heating systems; forced air and solar heating systems used in buildings; electrical systems of power distribution and lighting for commercial buildings among the topics covered.

*Lecture: 3 hours*

*Prerequisite(s): CNST-2131 Construction Methods and Materials or concurrent enrollment; and eligibility for MATH-0955 Beginning Algebra; or departmental approval.*

### **CNST-2330 Construction Scheduling**

#### **3 Credits**

Capstone course that involves time management of construction activities. Use of Gantt charts, activity on arrow diagrams, PERT techniques, and critical path method. Computer scheduling software will be used throughout the course.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-2131 Construction Methods and Materials, or departmental approval.*

### **CNST-2500 Construction Surveying**

#### **3 Credits**

Methods and procedures for construction surveying. Methods and procedures for establishing line, grade, horizontal circular and spiral curves, combinations of circular and spiral curves, vertical curves, parabolic curves, offset staking for rough and finished grade, and earthwork volume determination. Cross-sectioning methods and earthwork. Manual calculations and use of computer software.

Introduction to AutoDesk Civil 3D software.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-1410 Architectural CAD I, and CNST-2110 Basic Survey Practices; or department approval.*

### **CNST-2510 Introduction to Asset Management**

#### **3 Credits**

Introduction to asset management with a focus on utility systems spread over a geographic region. Covers principles of cartography and methods for presenting geographic information. Coordinate systems, map projections, scale, topographic mapping, thematic mapping, spatial analysis methods, and mapping accuracy are expanded upon from introductory course. Use Geographic Information Systems (GIS) to analyze and model engineering systems. Probability models and ways to achieve levels of service within an overall system will be covered. Laboratory element with case studies incorporated.

*Lecture: 2 hours. Laboratory: 3 hours*

*Prerequisite(s): MET-2430 Engineering Probability and Statistics; and CNST-1740 Fundamentals of Geographic Information Science.*

**CNST-2520 Aerial Surveying****3 Credits**

Introduction to the methods and procedures of aerial surveying using Unmanned Aircraft Systems (UAS) and its associated applications as it relates to land surveying and mapping. Processing collected data will be done using AutoDesk and/or ESRI software packages.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-2110 Basic Survey Practices; and CNST-2500 Construction Surveying, or CNST-1740 Fundamentals of Geographic Systems; or department approval.*

**CNST-2535 Legal Principles in Surveying****3 Credits**

The study of statute and common law pertaining to land surveying and real property rights. Methods to describe real property. A review of current practices, current court decisions, and applicable laws. Ohio Surveying Laws are examined and applied to real world scenarios.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-2110 Basic Survey Practices.*

**CNST-2540 Ohio Lands****2 Credits**

The study of the history and development of the original Ohio land subdivisions. Review of colonial systems and the Public Land Survey System in the United States. Historic methods of measuring the earth.

*Lecture: 2 hours*

*Prerequisite(s): CNST-2110 Basic Survey Practices*

**CNST-2550 3D Laser Scanning for Land Surveying****3 Credits**

Introduction to the methods and procedures of 3D Laser Scanning for land surveying applications. Aerial and terrestrial methods of data acquisition will be explored. Quality assurance and quality control. Processing collected data will be done using AutoDesk and/or ESRI software packages.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-2110 Basic Survey Practices; and CNST-2500 Construction Surveying or CNST-1740 Fundamentals of Geographic Systems; or department approval.*

**CNST-2560 Land Development Systems****3 Credits**

Advanced surveying topics including section and subdivision lines and residential properties. Reestablishment of property boundaries and legal considerations for boundary descriptions, including local municipal records. This course involves the development of preliminary plats, detailed plans, and a final plat in accordance with conveyance standards.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-1410 Architectural CAD I, and CNST-2110 Basic Survey Practices; or department approval.*

**CNST-2570 Geodetic Surveying****3 Credits**

Planning and execution of control surveying, cadastral surveying, network adjustment and topographic surveying using total stations and data collections, satellite positioning (Global Navigation Satellite System) and advanced imagery systems. Introduction to remote sensing such LIDAR and laser scanning.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-2500 Construction Surveying; or department approval.*

**CNST-2590 Professional Aspects of Land Surveying****1 Credit**

Introduction to professional practice and safety. Statute and common law pertaining to land surveying and real property rights. Metes and bounds legal descriptions and General Land Office/Bureau of Land Management real property descriptions. Minimum standards for boundary surveys. Minimum standards for mortgage location surveys. Code of ethics for Professional Engineers and Professional Surveyors. Case studies and lab activities.

*Laboratory: 3 hours*

*Prerequisite(s): CNST-1750 Construction Safety, and CNST-2535 Legal Principles in Surveying, or concurrent enrollment; or department approval.*

**CNST-2631 Construction Management Systems****3 Credits**

Study of construction management practices including general contracting, subcontracting, project delivery, cost control, change processes and procurement. Introduction into lien implications, safety, quality and jobsite labor relations.

*Lecture: 3 hours*

*Prerequisite(s): CNST-2131 Construction Methods and Materials.*

**CNST-2830 Cooperative Field Experience****1-3 Credits**

Open to students eligible for the Cooperative Education Program. Employment in an approved training facility under College supervision. Requirement for one credit is 180 hours of approved work. Students may earn up to three credits in one semester. May be repeated for an accrued maximum of nine credits.

*Other Required Hours: 180 clock hours of approved work per credit hour.*

*Prerequisite(s): See campus COOP Advisor for the Cooperative Education Program application.*

**CNST-2990 Construction Estimating & Cost Analysis****3 Credits**

Capstone course in Construction Engineering Technology program. Includes construction cost estimates, cost forecasting, and cost reports for a construction project using computer software.

*Lecture: 2 hours. Laboratory: 2 hours*

*Prerequisite(s): CNST-2131 Construction Methods and Materials or concurrent enrollment.*